

# Energy Management Energy Meter Type EM23 DIN



• Other version available (not certified, option X and P): see "how to order" on the next page

- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Class 2 (kvarh) according to EN62053-23
- Accuracy  $\pm 0.5$  RDG (current/voltage)
- Energy meter
- Instantaneous variables readout: 3 DGT
- Energies readout: 7 DGT
- System variables: W, var, Phase-sequence.
- Single phase variables: A
- Energy measurements: total kWh and kvarh
- TRMS measurements of distorted sine waves (voltages/currents)
- Self power supply
- 1 pulsating output
- Dimensions: 4-DIN modules
- Protection degree (front): IP50
- Easy connections management
- Certified according to MID Directive (option PF only): see "how to order" below

## Product Description

Three-phase energy meter with built-in configuration joystick and LCD data displaying; particularly indicated for active and reactive energy metering and for cost allocation. Housing for DIN-rail mounting with IP50

(front) protection degree. output proportional to the active energy being measured. Direct connection up to 65A. Moreover the meter is provided with one pulsating

**MID** Certified according to MID Directive, Annex "B" + Annex "D" or Annex "B" + Annex "F" for legal metrology relevant to active electrical energy meters (see Annex MI-003 of MID). Can be used for fiscal (legal) metrology.

## How to order **EM23 DIN AV9 3 X O1 PF**

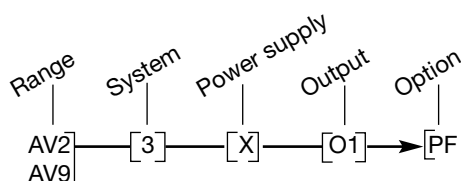


## Type Selection

Range codes	System	Output	Power supply
<b>AV2:</b> 400V <sub>LL</sub> AC 10(65)A (direct connection) V <sub>LN</sub> : 113V to 265V <sub>LN</sub> V <sub>LL</sub> : 196V to 460V <sub>LL</sub> <b>AV9:</b> 400V <sub>LL</sub> AC - 10(65)A (direct connection) V <sub>LN</sub> : 184V to 276V <sub>LN</sub> V <sub>LL</sub> : 318V to 480V <sub>LL</sub>	<b>3:</b> Balanced and unbalanced load: 3-phase, 4-wire; 3-phase, 3-wire;	<b>O1:</b> Open collector type (single pulse output)	<b>X:</b> Self power supply -15% +20% of the rated measuring input voltage, 45 to 65 Hz

### Options

**PF:** Certified according to MID Directive, Annex "B" + Annex "D" or Annex "B" + Annex "F" for legal metrology relevant to active electrical energy meters (see Annex MI-003 of MID). Can be used for fiscal (legal) metrology.



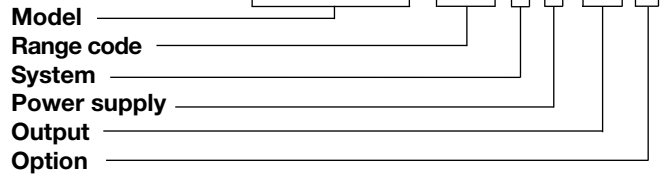
**NOTE:** please check the availability of the needed code on the verification path diagram on left before order .



**STANDARD**

Not certified according to MID directive. Cannot be used for fiscal (legal) metrology.

**How to order** **EM23 DIN AV9 3 X O1 P**

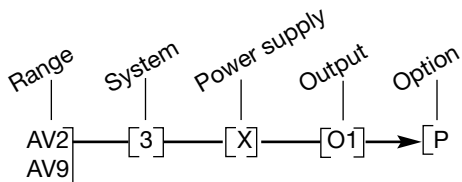


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**Options**

**P:** Bearing EC "Type examination" (annex B of MID) relevant to active electrical energy meters (see Annex MI-003).



**NOTE:** please check the availability of the needed code on the verification path diagram on left before order .

## Input specifications

<b>Rated inputs</b>	System type: 3	Energies (imported)	Autorange
Current type	By direct connection		6+1DGT or 7DGT (X and P options);
Voltage	AV2: 133/230 V <sub>LN</sub> AC 230/400 V <sub>LL</sub> AC		5+2, 6+1 or 7 DGT (PF option)
Current range (direct)	AV9: 230 V <sub>LN</sub> /400 V <sub>LL</sub> AC AV2 and AV9: 10 (65)AAC	Overload status	EEE indication when the value being measured is exceeding the "Continuous inputs overload" (maximum measurement capacity)
<b>Accuracy (Display)</b> (@25°C ±5°C, R.H. ≤60%, 48 to 62Hz)	lb: see below, Un: see below	Max. and Min. indication	Max. instantaneous variables: 999; energies: 9 999 999. Min. instantaneous variables: 0; energies 0.0 (X and P options), 0.00 (PF option)
AV2 model	lb: 10A, I <sub>max</sub> : 65A; Un: 113 to 265V <sub>LN</sub> (196 to 460V <sub>LL</sub> )		
AV9 model	lb: 10A, I <sub>max</sub> : 65A; Un: 184 to 276V <sub>LN</sub> (318 to 480V <sub>LL</sub> )		
Current (AV2, AV9)	From 0.004lb to 0.2lb: ±(0.5% RDG +3DGT). From 0.2lb to I <sub>max</sub> : ±(0.5% RDG +1DGT).		
Phase-neutral voltage	In the range Un: ±(0,5% RDG +1DGT)	<b>LEDs</b>	Red LED (Energy consumption), 0.001 kWh by pulse Max frequency: 16Hz according to EN50470-1
Phase-phase voltage	In the range Un: ±(1% RDG +1DGT)	<b>Measurements</b>	See "List of the variables that can be connected to:"
Active power	±(1% RDG +2DGT)	Method	TRMS measurements of distorted wave forms.
Reactive power	±(2% RDG +2DGT)	Coupling type	Direct
Active energy	Class 1 according to EN62053-21 and Class B according to EN50470-3	<b>Crest factor</b>	lb 10A ≤4 (91A max. peak)
Reactive energy	Class 2 according to EN62053-23	<b>Current Overloads</b>	
AV2, AV9 models	lb: 10A, I <sub>max</sub> : 65A; 0.1 lb: 1A, Start up current: 40mA	Continuous	65A, @ 50Hz
		For 10ms	1920A max, @ 50Hz
<b>Energy additional errors</b>		<b>Voltage Overloads</b>	
Influence quantities	According to EN62053-21, EN62053-23 and EN50470-1-2	Continuous	1.2 Un
		For 500ms	2 Un
<b>Temperature drift</b>	≤200ppm/°C	<b>Input impedance</b>	
<b>Sampling rate</b>	1600 samples/s @ 50Hz 1900 samples/s @ 60Hz	Voltage (AV2, AV9)	Refer to "Power Consumption"
<b>Display refresh time</b>	750 msec.	Current (AV2, AV9)	< 4VA
<b>Display</b>		<b>Frequency</b>	45 to 65 Hz
Type	2 lines (1 x 7 DGT; 1 x 3DGT)	<b>Joystick</b>	For variable selection.
Instantaneous variables read-out	LCD, h 9mm 3 DGT		

## Output specifications

<b>Digital outputs</b>		<b>Static output</b>	
Pulse type		Purpose	For pulse output
Number of outputs	100 pulses per kWh (0.01kWh/pulse).	Signal	V <sub>ON</sub> 1.2 VDC/ max. 100 mA V <sub>OFF</sub> 30 VDC max.
Type	Output connected to the active energy (kWh)	Insulation	By means of optocouplers, 4000 VRMS between output to measuring inputs.
Pulse duration	≥100ms < 120msec (ON), ≥120ms (OFF), according to EN62052-31		

## Software functions

<b>System selection</b> System 3-Phase unbalanced load	3-phase (4-wire); 3-phase (3-wire).	Both energy and power measurements are independent from the current direction. The displayed energy is always "imported"
<b>Displaying</b>	Up to 3 variables per page	
<b>Easy connection function</b>	Automatic phase sequence detection with current and voltage synchronisation.	

## General specifications

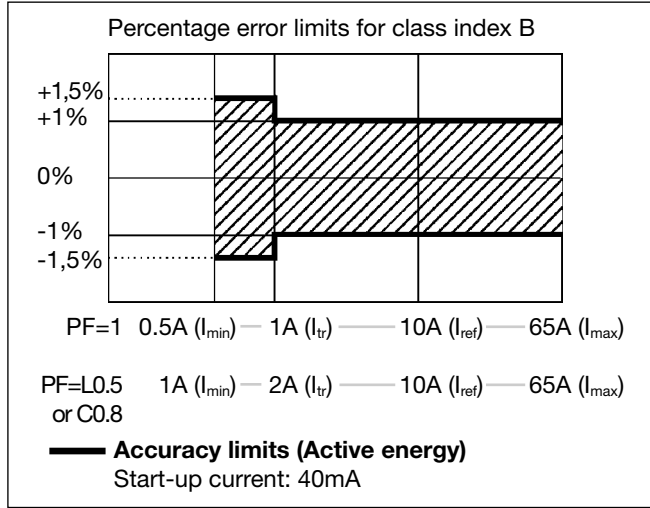
<b>Operating temperature</b>	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C) according to EN62053-21, EN62053-23 and EN50470-1	<b>Standard compliance</b> Safety	IEC60664, IEC61010-1 EN60664, EN61010-1
<b>Storage temperature</b>	-30°C to +70°C (-22°F to 158°F) (R.H. < 90% non-condensing @ 40°C) according to EN62053-21, EN62053-23 and EN50470-1	Metrology	EN62052-11, EN50470-1 EN62053-21, EN62053-23, EN50470-3. MID "Annex MI-003"
<b>Installation category</b>	Cat. III (IEC60664, EN60664)	Pulse output Approvals	DIN43864, IEC62053-31 CE, MID (PF option only)
<b>Insulation (for 1 minute)</b>	4000 VRMS between measuring inputs and digital output	<b>Connections</b> Cable cross-section area	Screw-type measuring inputs max. 16 mm <sup>2</sup> ; min. 2.5 mm <sup>2</sup> (by cable lug) Min./Max. screws tightening torque: 1.7 Nm / 3 Nm Output terminals: 1.5 mm <sup>2</sup> Screws tightening torque: 0.5 Nm
<b>Dielectric strength</b>	4000 VRMS for 1 minute	<b>Housing DIN</b> Dimensions (WxHxD)	71 x 90 x 64.5 mm
<b>Noise rejection CMRR</b>	100 dB, 48 to 62 Hz	Material	Nylon PA66, self-extinguishing: UL 94 V-0 DIN-rail
<b>EMC</b> Electrostatic discharges Immunity to irradiated	According to EN62052-11 15kV air discharge; Test with current: 10V/m from 80 to 2000MHz;	Mounting	
Electromagnetic fields	Test without any current: 30V/m from 80 to 2000MHz;	<b>Protection degree</b> Front	IP50
Burst	On current and voltage measuring inputs circuit: 4kV	Screw terminals	IP20
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz	<b>Weight</b>	Approx. 400 g (packing included)
Surge	On current and voltage measuring inputs circuit: 4kV.		
Radio frequency suppression	According to CISPR 22		

## Power supply specifications

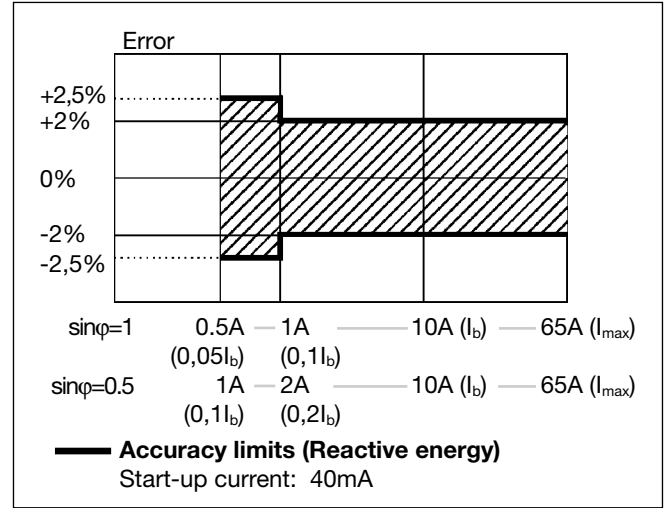
<b>Self supplied version</b> AV2 model	-15% +15% of Un, 48-62Hz.	in a 3-phase system with neutral may work also if one or two phases are missing.	
AV9 model	-15% +20% of Un, 48-62Hz.		
<b>Note</b>	The instrument provided with "O1" option, working	<b>Power consumption</b>	≤20VA/1W

### Accuracy (according to EN50470-3 and EN62053-23)

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



### MID "Annex MI-003" compliance (PF option only)

<b>Accuracy</b>	0.9 Un ≤ U ≤ 1.1 Un; 0.98 fn ≤ f ≤ 1.02 fn; fn: 50 or 60Hz; cosφ: 0.5 inductive to 0.8 capacitive. Class B I st: 0.04A; I min: 0.5A; I tr: 1A; I max: 65A.	<b>EMC compliance</b>	E2
<b>Operating temperature</b>	-25°C to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C)	<b>Mechanical compliance</b>	M2
		<b>Protection degree</b>	in order to achieve the protection against dust and water required by the norms harmonized to MID, the meter must be used only installed in IP51 (or better) cabinets.

### List of the available variables

No	Variable	3-ph. 4-wire bal. system	3-ph. 4-wire unbal. system	3 ph. 3-wire bal. system	3 ph. 3-wire unbal. system	Notes
1	A L1	x	x	x	x	
2	A L2	x	x	x	x	
3	A L3	x	x	x	x	
4	var sys	x	x	x	x	sys=system
5	W sys	x	x	x	x	sys=system
6	Phase seq.	x	x	x	x	
7	kWh	x	x	x	x	Total
8	kvarh	x	x	x	x	Total

(x) = available

## Display pages

Display variables in 3-phase systems with or without neutral

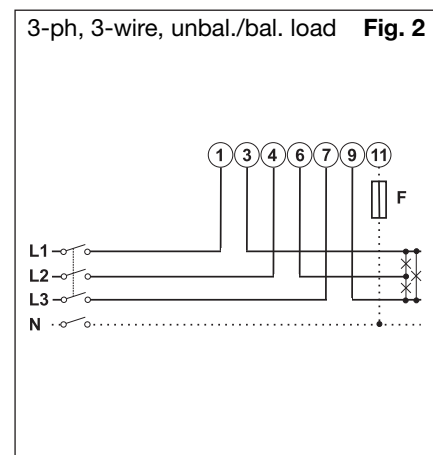
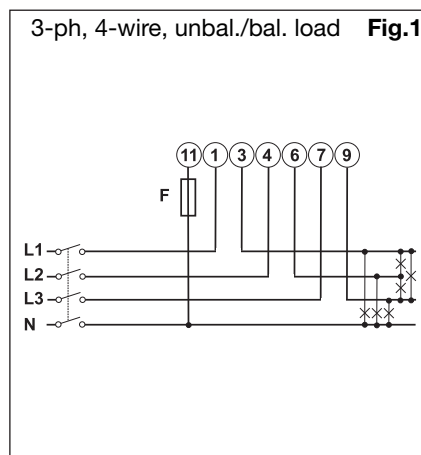
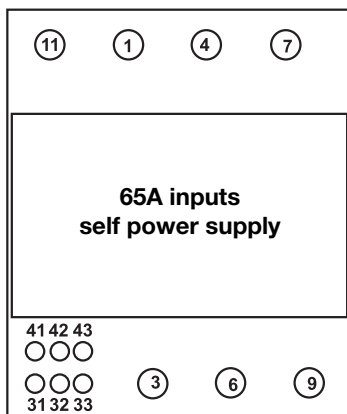
No	1 <sup>st</sup> line	2 <sup>nd</sup> line	Phase Sequence	Notes
1	Total kWh	kW sys	Warning triangle if reverse sequence	
2	Total kvarh	kvar sys	Warning triangle if reverse sequence	
3	AL1 - AL2	AL3	Warning triangle if reverse sequence	

Note: whatever page the user has selected, after 60s it goes back to page 1.

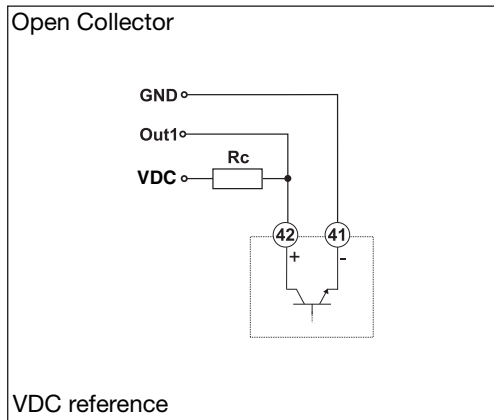
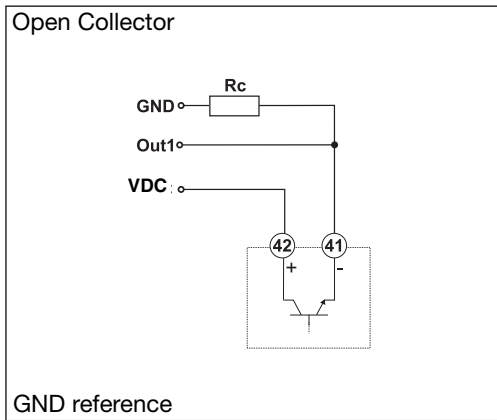
## Insulation between inputs and outputs

	Measuring Inputs	Open collector outputs	Self power supply
Measuring Inputs	-	4kV	0kV
Open collector outputs	4kV	-	4kV
Self power supply	0kV	4kV	-

## Wiring diagrams

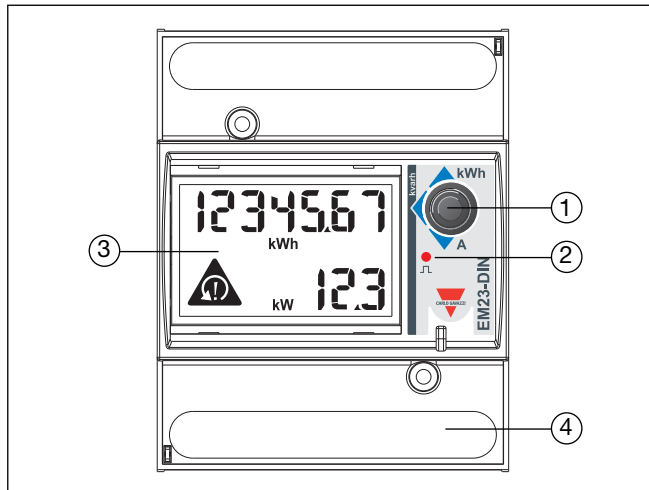


## Open collector output wiring diagrams



The load resistances ( $R_c$ ) must be designed so that the close contact current is lower than 100mA; the VDC voltage must be lower than or equal to 30VDC.

## Front panel description



1. **Joystick**  
To scroll the variables on the display.
2. **LED**  
Red LED blinking proportional to the energy being measured.
3. **Display**  
LCD-type with alphanumeric indications to display all the measured variables.
4. **Connections**  
Screw terminal blocks for instrument wiring.

## Dimensions

